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# THE ECONOMICS OF PRODUCTION AND MARKETING OF GREENHOUSE CROPS IN ALBERTA PART 2

## 1979-80



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THE ECONOMICS OF PRODUCTION AND  
MARKETING OF GREENHOUSE CROPS  
IN ALBERTA, 1979-80

By  
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June, 1981



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## FOREWORD

In 1978, The Alberta Agriculture Coordinating Committee requested that the Production Economics Branch undertake a comprehensive study of the greenhouse industry in Alberta. The committee suggested that the study examine taxation regulations of the greenhouse industry, greenhouse production costs and returns, and the major factors affecting the production of greenhouse crops in Alberta. To date three reports have been published.

The greenhouse taxation report was published in March, 1979. Its main recommendation was that all Alberta greenhouses be classified as farms for taxation purposes. A second report on the handling and transportation of flowers, fruits and vegetables in Alberta was released in March, 1980.

A preliminary report regarding the level of investment and production costs/returns for Alberta greenhouses was published in April 1980. This report covered the 1978-79 crop year.

This final report examines greenhouse investment, production costs and returns for the crop year 1979-80. It also lists the problems related to production and transportation, and other concerns as expressed by greenhouse operators.

Unlike the April 1980 preliminary report, the number of greenhouses studied was increased from 33 to 50 participants. Moreover, a few very large and diversified operations which participated in the preliminary study did not provide any information for the 1979-80 crop year. This final report, however, should be considered to be more representative of greenhouse operations in Alberta.

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G. Nabi Chaudhary



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## SECTION I

### INTRODUCTION

In the spring of 1978, The Alberta Agriculture Coordinating Committee requested that the Production Economics Branch undertake a study of factors affecting the production of greenhouse crops in Alberta. This request was based on the recommendation of the Protected Crops Advisory Committee, membership of which includes greenhouse operators and researchers in horticulture. This committee requested two separate studies. One study was to deal with the taxation regulations for the greenhouse industry; the second study was to examine production costs and returns, and the factors affecting the production of greenhouse crops in Alberta.

The taxation report entitled, Greenhouse Tax Structure in Alberta was published in March, 1979. The report on taxation regulations and their impact on the greenhouse industry in Alberta compared and contrasted the greenhouse tax structure in rural and urban areas of Alberta, and also Alberta versus other provinces. Recommendations were made in this report that greenhouse operations in Alberta should be classified as farming operations and greenhouse buildings and equipment should be exempted from assessment for taxation purposes. Since the release of this report, the government has modified its municipal tax regulations to provide significant tax relief to the greenhouse operators in cities and towns.<sup>1</sup>

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<sup>1</sup>In November 1980, regulations under the Municipal Taxation Act were amended to incorporate changes Governing Percentage Rates Applicable to Fair Actual Value of Improvements for Assessment Purposes. Effective January 1981, the improvements used for farming operations, other than the residence, situated in a city, town, new town, village, summer village or school district, are to be taxed approximately at one-half the rate of other improvements.



A second report entitled The Economics of Production and Marketing of Greenhouse Crops in Alberta based on the 1978 crop year information was completed and published in April 1980. That report provided information on production costs and returns for different sizes of greenhouse operations in various regions of the province. It also highlighted the problems in production, marketing, transportation, availability of finance and other concerns of the greenhouse operators in the Province.

This third report is a repetition of the second report based on the 1979-80 crop year data. At the outset of this project it was decided that it would be carried over two years in order to obtain a better assessment of the industry. In this report the sample size was increased to 50 greenhouse operators over the 1978 sample of 33.

#### Objectives of the Study

The following were the major objectives of this study:

1. Determination of the structure of the greenhouse industry in Alberta;
2. Estimation of costs and returns to Alberta greenhouse operators;
3. Identification of the main factors influencing production and marketing of greenhouse crops in Alberta;
4. Identification of the major problems experienced by greenhouse operators in Alberta; and
5. Suggestions and recommendations to enhance greenhouse production and alleviate certain problems facing the greenhouse industry in Alberta.

### The Study Sample

The questionnaire prepared for the first study year was modified to simplify data entry. The questionnaire was used to obtain the desired information from a systematic randomly selected sample of greenhouse operators across the province. It was envisaged that because of the uniqueness of each operation there might be some problems in selecting the sample. However, efforts were made to reduce this problem by selecting participants who appeared to be typical of particular class sizes in the industry.

During the course of this study, all district agriculturists were contacted to obtain names of greenhouse operations in their districts. Names of over 130 greenhouse operations were provided by various district offices. Thirty study participants were retained from the previous year and 20 new participants were added to expand the sample size to 50. The main objective for expanding the sample size was to have better representation of the industry for the purposes of this study.

### Method of Analysis

The technique used to analyze the data was "SPSS" (Statistical Package for the Social Sciences). SPSS is an integrated system of computer programs for the analysis of social science data. It provides the user with a comprehensive set of procedures for data transformation and file manipulation, and it offers the researcher a large number of statistical routines commonly used in the social sciences.<sup>1</sup>

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<sup>1</sup>Norman, H. Nie; Dale H. Bent and C. Hadlai Hull, Statistical Package for the Social Sciences, McGraw-Hill Book Company, New York, April 1971, pp. 1-3.

After obtaining the completed questionnaires from the study participants (greenhouse operators), all of the data were transferred to computer input sheets. The input sheets accomodated all of the information recorded on the questionnaire. Data from input sheets were recorded onto the computer tapes for analytical purposes.

Each greenhouse operation was analyzed separately and the study participant received a detailed personalized report of his greenhouse operation. Later the entire sample was divided into two groups to determine representative costs and return estimates for northern and southern areas of the province.

The sample size was further divided into three groups by the type of crops produced and by the size of the operations. This break-down provided information showing which crops had better returns and what size category of the greenhouse operation was more profitable.



## SECTION II

### GREENHOUSE OPERATIONS IN ALBERTA

#### Location and Size of Greenhouses

Although greenhouses in Alberta are scattered throughout the province, more than two-thirds of these operations are located in the south and south-central regions. Most of the greenhouses are located in towns and cities because of easy access to labor, marketing facilities, utilities and services necessary for the greenhouse operation. A few are located on farms where, because they are part of the farm business, they are relatively smaller in size when compared to greenhouses situated in towns and cities.

The exact number of commercial greenhouses in Alberta is not available as no survey has been undertaken to identify the location and number of greenhouses in the Province. A list compiled with the assistance of district agriculturists, which by no means is complete, indicated that there were about 132 greenhouse operations in the province. Out of this list over 100 may be classified as commercial greenhouses and the remainder as hobby greenhouses. It is still possible that a few commercial greenhouses might have been omitted from the list. The fact that every year a few greenhouses go out of business while some enter the industry, further adds to the difficulty of determining the precise number of greenhouses in the Province.

Statistics Canada undertakes a survey of the greenhouse industry every year to identify the number of commercial operations, crops grown and the total output of crops in a controlled environment. In 1977, all known greenhouse operators in Alberta were contacted by Statistics Canada and

only 79 firms reported on their operations. In 1978, number of firms reporting on their greenhouse operations was down to 71. In 1979, 86 firms reported on their greenhouse operations. From these surveys, it was estimated that greenhouse area in Alberta under glass and plastic was about 1.794 million square feet in 1977, which increased to 1.837 million square feet in 1978. In 1979, area under greenhouses increased to 2.196 million square feet, mostly because of the increase in the number of firms reporting on their operations.

Average area per firm, both under glass and plastic was 22,703 square feet in 1977, as reported by the Statistics Canada survey. It increased to 25,875 square feet per firm in 1978 and decreased marginally to 25,535 square feet in 1979. Gross sales for the greenhouse produce increased to \$10.913 million in 1979 from \$9.044 million in 1977, about a 21 per cent increase over three years. Average sales per firm were \$114,485 and \$141,394 in 1977 and 1978 respectively. In 1979, average sales per firm were \$126,902, about 11 per cent lower than the sales in 1978. Average sales per square foot of greenhouse area under glass and plastic was \$4.97 in 1979 as compared to \$5.04 in 1977 and \$5.49 in 1978. Details regarding total area under glass and plastic, and total sales of vegetables, bedding plants and ornamental flowers in Alberta for 1977 to 1979 are presented in Table 1.

The sizes of the greenhouses surveyed for this 1979-80 Alberta Agriculture study ranged from 1,200 square feet to 173,508 square feet. Distribution of the greenhouse area under glass, fiberglass and plastic is presented in Table 2. Group I represents north and north-central Alberta (Regions 3-6); Group II represents south and south-central Alberta (Regions 1 and 2).

TABLE 1 TOTAL GREENHOUSE AREA AND SALES OF ORNAMENTAL FLOWERS AND VEGETABLES IN ALBERTA, 1977 - 1979

Area of Glass and Plastic		<u>1977</u>	<u>1978</u>	<u>1979</u>
1.	Number Reporting	79	71	86
2.	Total Area Sq Ft.	1,793,529	1,837,121	2,196,040
	Sq M	161,417	165,341	197,643
	Sq Ft.	22,703	25,875	25,535
	Sq M	2,043	2,329	2,298
A.	<u>Glass</u>			
	Number Reporting	51	48	52
	Area Sq Ft.	1,286,683	1,319,231	1,446,524
	Area Sq M	115,801	118,731	130,187
	Av/Firm Sq Ft.	25,229	28,679	27,818
	Sq M	2,271	2,581	2,504
B.	<u>Plastic</u>			
	Number Reporting	51	44	55
	Area Sq Ft.	506,846	517,890	749,516
	Sq M	45,616	46,610	67,456
	Av/Firm Sq Ft.	9,936	11,770	13,628
	Sq M	894	1,059	1,226
C.	<u>Sales</u>			
	Number Reporting	79	71	86
	Total Sales "\$"	9,044,290	10,038,976	10,913,576
	Av/Firm \$	114,485	141,394	126,902
	Sales/Sq Ft. of glass & plastic \$	5.04	5.46	4.97
	Sales/Sq M of glass & plastic \$	56.03	60.72	55.22

SOURCE: Statistics Canada, Greenhouse Industry, Cat. No. 22-202, Annual, 1977 - 1979



TABLE 2 GREENHOUSE AREA BY THE TYPE OF STRUCTURE FOR THE GREENHOUSES SURVEYED, 1979 - 1980

Greenhouse Area - - Square Feet						
	No. Of Greenhouses Surveyed	Glass	Fiber Glass	Plastic	Total	Average Per Grower
Group I <sup>1</sup>	19	86,966	191,269	139,328	417,563	21,977
Group II <sup>2</sup>	31	766,190	62,635	3,080	831,905	26,836
TOTAL	50	853,156	253,904	142,408	1,249,468	24,989

<sup>1</sup> Group I represents north and north central regions (3,4,5 and 6).

<sup>2</sup> Group II represents south and south central regions (1 and 2).

Figure 1 shows the regional distribution of greenhouses in Group I and Group II. In Group I, total area under glass was 86,966 square feet, about 21 per cent of the total greenhouse area surveyed in the north and north-central regions. The greenhouse area under fiberglass and plastic amounted to 191,269 square feet (45%) and 139,328 square feet (34%), respectively.

In Group II, the distribution of the greenhouse area for the 31 study participants was quite different from that in Group I. About 92 per cent of the total area reported was under glass compared to 7.5 per cent under fiberglass. Area under plastic was almost negligible (0.5%). Greenhouse operators in the south and south-central Alberta reported 766,190 square feet under glass, 62,635 and 3,080 square feet under fiberglass and plastic, respectively.

Total area of the greenhouses surveyed for the greenhouse crop year 1979-80 was 1,249,469 square feet, of which 853,156 square feet (68.5%) was under glass, 253,904 square feet (20%) under fiberglass and 142,408 square feet (11.5%) under plastic. Average area per grower for Group I study participants was 21,977 square feet compared to 26,836 square feet for Group II. Average area for the entire study sample was 24,989 square feet.<sup>1</sup> It is interesting to note that 90 per cent of the glass structures were in the south and south-central regions (Group II), with 10 per cent in the north and north-central regions (Group I). On the other hand, 75 per cent of the total fiberglass and about 63 per cent of the total plastic structures were in the northern regions.

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<sup>1</sup>A few greenhouse operators surveyed in 1978 in north and north-central regions i.e., Group I, were not included in the 1979-80 survey because of their reluctance to provide detailed information required for this study. Moreover, these operations were so large and diversified that they could not be regarded as representative of the greenhouse industry in Alberta.



FIGURE 1

# ALBERTA AGRICULTURE REGIONS

Group I includes regions  
3, 4, 5 and 6.

Group II includes regions  
1 and 2.



### Physical Characteristics of Greenhouses

There are many types of greenhouses in Alberta ranging from small shed roof "lean-to" houses constructed of wood-frame sash to the large modern steel frame houses with truss supported roofs. Most new houses are of steel, wood or masonry construction covered either with glass, fibreglass, single plastic, or a double layer of plastic. A 1979 survey carried out by Statistics Canada reported that 86 commercial greenhouses in Alberta had just over 1.4 million square feet (66%) of glass and fibreglass, and 749,516 square feet (34%) of plastic.

Major internal features of greenhouse systems in Alberta are as follows:

#### i) Temperature Control

A year-round greenhouse operation is heated with natural gas to maintain optimum temperatures for crops grown during winter months. Some vegetable producing greenhouses operate for 9 to 10 months of the year and close down during November and December. Almost all of the greenhouses in southern Alberta are heated by natural gas burners and when combined with stove pipes, these burners provide sufficient heating through natural air movement. Greenhouses in northern Alberta are equipped with natural gas boilers and hot water pipes for heating. All boiler heating systems have automatic temperature control devices.

In addition to heating systems, most greenhouses in Alberta are equipped with a cooling system called pad and fan. The cooling system is essential if temperatures are to be lowered during the hot summer months.

## ii) Watering System

The watering of ground beds is usually accomplished by the use of soaker hoses which run on each side parallel to the bed. Bench beds and potted plants are usually watered with the use of chapin tubes. Smaller operations may utilize water supply pipes along with garden hoses.

## iii) Supplementary Lighting

Very few greenhouses have supplementary lighting. Those that do, have lighting in the form of ordinary lamps, usually five to six feet apart. Supplementary lighting is mostly used for producing chrysanthemums.

## Greenhouse Crops

Greenhouses in Alberta produce many kinds of flowers, chrysanthemums and roses being the most common potted plants. Other potted plants include geraniums and potted mums. Outdoor flowers such as petunias and marigolds are also produced in these greenhouses. Some greenhouse operations concentrate on importing tropical plants which are acclimatized to Alberta before they are sold. The most commonly grown greenhouse vegetables are cucumbers and tomatoes.

Greenhouses surveyed for this study could be divided into three groups on the basis of major crops grown. Twenty three greenhouses (46%) produced mainly vegetables. Fifteen greenhouses (30%) produced bedding plants, potted plants and vegetables, the major crop being cucumbers; other crops included cabbage, peppers and tomatoes. Twelve greenhouses (24%) produced mainly flowers with some bedding plants, potted plants and vegetables. Greenhouses producing flowers were in operation year round whereas the vegetable greenhouses were in operation for about 10 months, February through November. Greenhouses producing bedding plants were in operation for about 5 months, February to end of June.

### Greenhouse Production

The only data available to indicate greenhouse production in Alberta are the gross sales which were \$9.0 million in 1977, \$10.0 million in 1978 and \$10.9 million in 1979. The number of firms reporting on their greenhouse operations increased from 79 in 1977 to 86 in 1979. The moderate increase in gross sales may be attributed to higher prices received for produce sold and an increase in the number and size of greenhouses reporting.

### Marketing of Greenhouse Produce

Greenhouse operators surveyed for this study used several marketing channels to sell their produce. Twenty four per cent (12) of the greenhouse operators studied produced flowers, bedding plants and selected vegetables. One half (6) of these operators owned retailing facilities which were attached to the greenhouse or located in the shopping centres; these retail outlets handled 70 to 80 per cent of the produce; the remaining produce was shipped to wholesalers and retailers. The other half of these (6) greenhouse operators marketed 15 to 20 per cent of their produce at the gate and the balance was sold to wholesalers and retailers.

Thirty per cent (15) of greenhouses studied, produced bedding plants and some vegetables. Four of these greenhouse operators marketed 70 to 80 per cent of the produce directly at the greenhouse and the remainder was sold through wholesalers and retailers. Eleven greenhouse operators marketed only 15 to 20 per cent of the produce at the gate; nearly 60 to 70 per cent of the produce was sold to retailers, with the remainder going to wholesalers.



The remaining forty six per cent (23) of the greenhouses surveyed produced only vegetables. With the exception of four greenhouses which sold most of their produce to retailers and wholesalers, the other greenhouses were located in southern Alberta, in and around the Medicine Hat area. Practically all of these southern operations marketed their produce through the Red-Hat Co-op at Redcliff. Producers paid a commission or fee set by the Board of Directors of the Co-op.<sup>1</sup> The fees covered grading, packaging, storage, distribution and administration costs of the produce received at the Co-op.

Finally, it should be noted that greenhouse vegetable and bedding plant producers in north-central Alberta marketed 30 to 40 per cent of their produce at the gate and 60 to 70 per cent through rented stalls and booths in shopping centres and at farmers' markets.

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<sup>1</sup>Red Hat Co-op is a producer organization responsible for marketing vegetables grown in the greenhouses.

## SECTION III

### GREENHOUSE PRODUCTION COSTS AND RETURNS

#### Computation of Individual Cost Components

##### i) Interest on Investment

Interest is defined as a sum paid or calculated for the use of capital. The sum is usually expressed in terms of a rate or percentage of the capital involved, called the interest rate.

Interest rate is charged for the use of capital invested. Had the capital not been invested to buy a specific asset, it could have been utilized elsewhere either within or outside the firm, and would have brought some additional return to the firm.

A flat rate of 12 per cent was used for the purposes of this study to determine a fair return to land investment. Building and equipment interest rate was also calculated at 12 per cent. Interest applied on operating capital was 15 per cent.

##### ii) Depreciation

Depreciation is defined as the loss in value over time mainly as a result of obsolescence. In the case of buildings and equipment, it is that portion of the decrease in value resulting from ownership and the passage of time. Obviously, part of the reduced value of the buildings and equipment is the result of usage and is considered a variable cost. The entire depreciation has been considered a fixed cost.

In computing depreciation, a 10 per cent allowance or salvage value was taken from the purchase price of the buildings and equipment. The following formula was used in

arriving at depreciation for buildings and equipment.

$$\text{Depreciation} = \frac{\text{Purchase Price} - \text{Salvage Value}}{\text{No. of Years of Life}}$$

iii) Land Value

Land associated with the greenhouse operation was valued at \$1,700 per acre irrespective of its location. This value was determined through real estate values for good farmland suitable for a greenhouse operation. It can be argued that allocation of land value distorts the land value in and around urban areas relative to farmland. However, for uniformity and reasonable cost estimates, it was decided to standardize the land value regardless of its location. Researchers are aware that land values in cities or towns are much higher than \$1,700 per acre but if market values are used for land acquired five or ten years ago, it would lead to enormously high fixed costs which would greatly inflate overall production costs.

Most of the greenhouse operators surveyed have been in the greenhouse business for quite some time with the exception of two who got into the business three to four years ago. It should also be noted that the uniform land value was used to compute the average land value investment for all study participants.

iv) Property and Business Taxes

Taxes on real estate include payments on assessment of the greenhouse operations less any assessment for the greenhouse operator's residence or operations other than the greenhouse. There is a business tax for greenhouses located in urban municipalities. The exact amount of business tax was included in the costs.



v) Labor Costs

Hired labor costs included the amount of wages paid and any benefits received by the hired workers such as contributions to Workers' Compensation, Canada Pension Plan and Unemployment Insurance.

The hours spent by the operator and his family in greenhouse production were estimated. An operator's labor was valued at \$5.50 per hour and family labor was valued at a rate equal to that paid to hired labor or the actual amount paid to family members.

vi) Production Materials and Supplies

Production materials and supplies included purchase of cuttings, seed, plants, fertilizers, chemicals, soils, vermiculite, perlite, peat moss, straw, peat pots and plastic. Costs for production materials and supplies were the actual figures provided by the study participants.

vii) Heating Costs

Almost all the greenhouse operators had reasonably accurate costs for heating the greenhouses with natural gas. These good records of monthly bills were helpful in arriving at the total heating costs.

viii) Utility Costs

Utility costs included electricity, telephone and water. Where the utility bill was combined with the greenhouse operator's residence, the operator was asked to apportion the bill to arrive at total utility costs for the greenhouse operation.

ix) Transportation Expenses

Expenses for trucks or other vehicles owned by the greenhouse operators were apportioned according to use in

greenhouse operations, and personal and leisure driving. Freight charges paid to commercial or private carriers for hauling greenhouse produce or supplies were included in the transportation expenses.

x) Maintenance Costs

Maintenance costs included repairs to greenhouse structures, boilers, heating equipment, tractors and all other machinery and equipment associated with the greenhouse operation.

xi) Miscellaneous Costs

These costs included legal and accounting fees, office supplies, bad debts, donations and membership fees, insurance costs and other cost items incurred in a greenhouse operation.

xii) Marketing Charges

Marketing charges were the actual amount paid by each greenhouse operator for having his produce marketed through the Co-op at Redcliff. These charges covered grading, packaging and commission fees. The charges paid by each grower were included as a cost item in the study.

Greenhouse Investment Costs by Region

Greenhouse investment costs for 1979-80 were obtained directly from the study participants during the survey. Each operator was asked to value his greenhouse structure based on the current market costs or on replacement value. Greenhouse operators were also asked to provide an estimate of the life of the structure in order to work-out interest and depreciation costs. During analysis of the data, it was realized that some operators gave higher estimates for

their structures and in these instances available market rate for constructing greenhouses was used and reasonable life figures were assumed to compute investment costs.

Investment costs were calculated on land, buildings, machinery, automotives and other miscellaneous equipment. Details on average investment and investment costs for the greenhouses in Group I, Group II and the study sample are given in Table 3.

i) Land Investment

Average land area associated with the greenhouses, such as buildings (production area and office) and parking space, were 1.84 acres for Group I participants, 1.43 acres for Group II participants, and 1.59 acres for the study sample. Average land investments per greenhouse in Group I, Group II, and the study sample were \$3,131, \$2,436 and \$2,700 respectively. Land investment cost (land interest) for each greenhouse averaged 2.0¢, 1.0¢ and 1.0¢ per square foot for Group I, Group II, and the study sample, respectively.

ii) Building Investment

Average building investment based on the replacement value in 1979-1980 was \$73,647 per greenhouse operation in Group I, \$75,558 for Group II greenhouses, and \$74,832 for the study sample. Average investment costs composed of interest and depreciation on buildings were \$10,795, \$10,983 and \$10,912 per greenhouse for greenhouses in Group I, Group II, and the study sample respectively. The corresponding investment costs per square foot of greenhouse were 49¢, 41¢ and 44¢, respectively (Table 3).

iii) Equipment Investment

Average machinery investment based on the purchase price of the equipment was \$25,201 per greenhouse for Group



TABLE 3      AVERAGE INVESTMENT AND INVESTMENT COSTS FOR THE GREENHOUSES

SURVEYED, 1979-80

	<u>Group I</u>	<u>Group II</u>	<u>Study Sample</u>
Number Surveyed	19	31	50
Land Area (acres)	1.84	1.43	1.59
Land Value (\$)	3130.68	2435.94	2699.94
Land Interest (\$)	375.68	292.31	323.99
Land Interest Per Sq. Ft. (\$)	0.02	0.01	0.01
Building Area (Sq. Ft.)	21977	26836	24989
Building Investment (\$)	73647.00	75557.56	74831.56
Building Interest (\$)	8837.63	9066.91	8979.78
Building Depreciation (\$)	1957.76	1916.09	1931.91
Average Building Interest & Depreciation Per Sq. Ft. (\$)	0.49	0.41	0.44
Equipment Investment (\$)	25201.26	20196.42	22098.26
Equipment Interest (\$)	3024.15	2423.57	2651.78
Equipment Depreciation (\$)	903.22	673.85	761.01
Average Equipment Interest & Depreciation Per Sq. Ft. (\$)	0.18	0.12	0.14
Automotive Investment (\$)	9039.37	7041.96	7800.98
Automotive Interest (\$)	1084.72	845.04	936.12
Automotive Depreciation (\$)	506.53	398.81	439.74
Average Automotive Interest & Depreciation Per Sq. Ft. (\$)	0.07	0.05	0.06
Average Investment Per Greenhouse (\$)	111018.31	105231.87	107430.75
Average Investment Per Sq. Ft. (\$)	5.05	3.92	4.30
Average Investment Costs (\$)	16689.68	15616.55	16024.34
Average Investment Costs Per Sq. Ft. (\$)	0.76	0.58	0.64

I, \$20,196 for Group II, and \$22,098 for the study sample. Average investment costs for machinery and equipment were 18¢ per square foot of the greenhouse are for Group I participants, 12¢ per square foot for Group II, and 14¢ per square foot for the study sample. Details on investment cost, i.e., interest and depreciation on machinery and equipment are presented in Table 3.

iv) Automotive Investment

Average investment on automobiles was \$9,039 per greenhouse for participants in Group I, \$7,042 for Group II, and \$7,801 for the study sample. Average investment costs were 7¢, 5¢ and 6¢ per square foot for Group I, Group II, and the study sample, respectively.

v) Total Investment and Investment Costs

Average investment per greenhouse for the study participants in north and north-central Alberta (Group I) was \$111,018 compared to \$105,232 per average greenhouse for the participants in south and south-central Alberta. Average investment for the study sample as a whole was \$107,431 per greenhouse. Average investment per square foot of the greenhouse area was \$5.05, \$3.92 and \$4.30 for Group I, Group II, and the study sample, respectively.

Average investment costs per greenhouse were \$16,690 for Group I, \$15,617 for Group II, and \$16,024 for the study sample. Average investment costs per square foot ranged from 58¢ for Group II study participants to 76¢ for greenhouse operators in Group I. Average investment costs for the study sample were 64¢ per square foot. Details on average investment and investment costs are provided in Table 3.

### Greenhouse Operating Costs by Regions

Greenhouse operating costs include all costs incurred during the production of greenhouse crops. Some of the most common operating costs are hired labor, planting materials, containers, greenhouse fuel, fertilizers, chemicals, repairs, maintenance, power, water, property taxes and purchase of supplies. Average operating costs incurred in a greenhouse in 1979-1980 are listed in Table 4. Out of all the operating cost items, hired labor costs were the highest at \$15,139 for Group I, \$17,114 for Group II, and \$16,364 for the study sample. The second highest cost item was growing media, seed and cuttings which amounted to \$13,547 for the study participants in Group I versus \$10,475 for Group II participants; the average for the study sample was \$11,643 per greenhouse. Fuel costs for the heating of greenhouses were at \$6,068 for Group I, 1.6 times those of Group II (\$3,578). Average greenhouse fuel costs for the study sample were at \$4,524.

Greenhouses in north and north-central Alberta (Group I) reported average operating costs of \$63,400 per greenhouse versus \$68,842 in south and south-central Alberta (Group II). Average operating costs for the study sample amounted to \$66,774. Average operating costs per square foot of the greenhouse area for Group I, Group II, and the study sample were \$2.88, \$2.57 and \$2.67 respectively.

### Production Costs and Returns by Regions

Results presented in Tables 4 and 5 show that the major costs in greenhouse operations were labor (hired, operator and family), followed by material inputs (cuttings, seed, fertilizers, chemicals, containers and labels), greenhouse

TABLE 4

AVERAGE GREENHOUSE OPERATING COSTS  
FOR THE GREENHOUSE SURVEYED, 1979-80

	<u>Group I</u>	<u>Group II</u>	<u>Study Sample</u>
Number Surveyed	19	31	50
GREENHOUSE AREA (SQ. FT.)	21977	26836	24989
GROSS REVENUE	\$ 94016.19	92953.69	93357.44
Growing Media, Seed & Cuttings	\$ 13547.37	10475.42	11642.76
Fertilizer and Chemicals	1140.79	1652.74	1464.40
Containers, Labels and Tags	4350.31	1718.84	2718.80
Hired Labor	15138.84	17114.48	16363.74
Depreciation <sup>1</sup>	3367.26	2988.72	3132.55
Greenhouse Fuel	6068.42	3577.57	4524.09
Utilities <sup>2</sup>	2659.84	1943.12	2215.47
Insurance and Registration Fees <sup>3</sup>	885.42	1453.19	1237.44
Repairs and Maintenance <sup>4</sup>	3421.84	6895.40	5575.45
Freight Leasing and Express	1052.79	1383.13	1257.60
Property Taxes	695.74	2530.55	1833.32
Business Taxes	63.74	101.26	87.00
Office Supplies	345.37	1379.52	986.54
Advertising	821.21	432.13	579.98
Accounting and Legal	517.16	737.81	653.96
Marketing Costs <sup>5</sup>	162.74	3452.42	2202.34
Travel, Donations, Memberships	469.84	537.35	511.70
Miscellaneous <sup>6</sup>	421.79	1478.84	1077.16
Interest on Operating Capital	8269.55	8979.35	8709.62
AVERAGE OPERATING COSTS PER GREENHOUSE	\$63399.89	68841.56	66773.56
AVERAGE OPERATING COSTS PER SQ. FT.	\$ 2.88	2.57	2.67

<sup>1</sup>Includes Depreciation on Buildings, Equipment and Transportation Units.

<sup>2</sup>Includes Power, Water, Telegram and Telephone.

<sup>3</sup>Includes Motor Vehicles, Greenhouse and Labor Insurance.

<sup>4</sup>Includes Repair, Maintenance and Fuel Expenses for Equipment, Buildings and Motor Vehicles.

<sup>5</sup>Includes commission and other marketing costs.

<sup>6</sup>Includes small tools, shop supplies, soil testing and promotional expenses other than advertising.



TABLE 5 COMPARISON OF COSTS AND RETURNS BETWEEN GROUP I,  
GROUP II, AND THE STUDY SAMPLE, 1979-80

	<u>Group I</u>	<u>Group II</u>	<u>Study Sample</u>
Number Surveyed	19	31	50
AVERAGE AREA (SQ. FT.)	21977	26836	24989
GROSS REVENUE (\$)	94016.19	92953.69	93357.44
Gross Revenue Per Sq. Ft. (\$)	4.28	3.46	3.74
<u>OPERATING COSTS</u>			
Material Inputs	\$19038.47	13857.00	15825.96
Hired Labor	15138.84	17144.48	16363.74
Greenhouse Fuel and Utilities	8728.26	5520.69	6739.56
Insurance and Registration Fees	885.42	1453.19	1237.44
Repairs and Maintenance	3421.84	6895.40	5575.45
Taxes	759.48	2631.81	1920.32
Office Supplies	345.37	1379.52	986.54
Freight, Leasing and Express	1052.79	1383.13	1257.60
Donations, Memberships and Travel	469.84	537.35	511.70
Advertising	821.21	432.13	579.98
Accounting and Legal	517.16	737.81	653.96
Marketing Costs	162.74	3452.42	2202.34
Miscellaneous <sup>1</sup>	421.79	1478.84	1077.16
Depreciation	3367.26	2988.72	3132.55
Interest on Operating Capital	8269.55	8979.35	8709.62
TOTAL OPERATING COSTS	\$63399.89	68841.56	66773.56
<u>OTHER COSTS</u>			
Land, Building, Equipment Interest	\$13322.18	12627.81	12891.67
Operator's Labor	16145.47	18686.93	17721.18
TOTAL OTHER COSTS	\$29467.65	31314.74	30612.85
TOTAL PRODUCTION COSTS	\$92867.54	100156.30	97386.41
TOTAL PRODUCTION COSTS PER SQ. FT.	\$ 4.23	3.73	3.90
NET GREENHOUSE INCOME	\$30616.30	24112.13	26583.88
RETURN OVER CASH COSTS <sup>2</sup>	\$33983.56	27100.85	29716.43
RETURN OVER CASH COSTS PER SQ. FT.	\$ 1.55	1.01	1.19
RETURN TO MANAGEMENT	\$ 1148.65	(7202.61)	(4028.97)
RETURN TO MANAGEMENT PER SQ. FT.	\$ 0.05	(0.27)	(0.16)

<sup>1</sup>Includes small tools, shop supplies, soil testing and promotional costs other than advertising.

<sup>2</sup>Total operating costs less depreciation.

fuel and utilities, repairs and maintenance. The relative shares of these production costs for the study sample were 35 per cent, 16 per cent, 7 per cent and 5 per cent respectively. Average fuel and utility costs per greenhouse operation in Group I was 9.5 per cent of total operating costs compared to 5 per cent for Group II greenhouses.

Business and property taxes for the study sample comprised almost 3 per cent of total operating costs. These taxes amounted to 1.1 per cent of operating costs for Group I, north and north-central Alberta study participants, and 3.8 per cent for Group II, south and south-central Alberta.

Production costs for the typical greenhouse surveyed amounted to \$97,386 or \$3.90 per square foot. Production costs for greenhouses in north and north-central Alberta, Group I, were \$92,868 compared to \$100,156 for greenhouses in south and south-central Alberta, Group II. Correspondingly, average production costs per square foot were \$4.23 and \$3.73.

Average gross revenue per greenhouse studied in 1979-1980 was \$93,357 or \$3.74 per square foot. Average gross revenue for Group I participants was \$94,016 or \$4.28 per square foot against \$92,954 or \$3.46 per square foot for Group II participants. Details of operating costs and production costs are provided in Table 5.

Average net greenhouse income and return over cash costs were positive for both groups of growers and the study sample. Average net greenhouse income ranged from \$24,112 for Group II to \$30,616 for Group I; the average for the study sample was \$26,584. Returns over cash costs were lower in the south, Group II (\$1.01 per square foot) than in the north, Group I (\$1.55 per square foot). Average return over cash costs for the study sample was \$1.19 per square foot.

Average return to management was positive for Group I participants and negative for Group II and the study sample. Return to management was only 5¢ per square foot for Group I, whereas it was negative by 27¢ and 16¢ for Group II and the study sample, respectively. Further details on costs and returns for the three categories are presented in Table 5.

#### Greenhouse Investment Costs by Crops Produced

The study sample was divided into three categories by the type of crops produced. There were 23 greenhouses mainly producing vegetables, 15 greenhouses producing bedding plants and vegetables with bedding plants being the major enterprises, and 12 greenhouses producing flowers, bedding plants and selected vegetables.

Average land area associated with the group of greenhouses producing a combination of crops, i.e., flowers, bedding plants and vegetables, was about 3 acres. Land area for the vegetable producing group was 1.06 acres and 1.28 acres for the bedding plants and vegetables group. Average greenhouse area for the bedding plants and vegetable group was the smallest at 8,905 square feet compared to 20,649 square feet for the vegetable group and 53,413 square feet for the flowers, bedding plants and vegetables group.

Investment for buildings, equipment and automotives was relatively higher for the bedding plants and vegetables group compared to the other two groups. Building investment costs were 48¢ per square foot for the bedding plants and vegetables group against 42¢ and 44¢ for the vegetables group and the crop combination group, respectively. Equipment and automotive investment costs were also higher for the bedding plants and vegetables group at 34¢ per square foot versus 15¢ per square foot for vegetable group and 19¢ for the crop combination group.

TABLE 6

COMPARISON OF INVESTMENT AND INVESTMENT COSTS

BY GREENHOUSE CROPS, 1979-80

	<u>Vegetables</u>	<u>Bedding Plants &amp; Vegetables</u>	<u>Flowers, Bedding Plants &amp; Vegetables</u>	<u>Study Sample</u>
Number Surveyed	23	15	12	50
Land Area (acres)	1.06	1.28	2.98	1.59
Land Value (\$)	1808.65	2174.87	5064.58	2699.94
Land Interest (\$)	217.04	260.98	607.75	323.99
Land Interest Per Sq. Ft. (\$)	0.01	0.03	0.01	0.01
Building Area (Sq. Ft.)	20649	8905	53413	24989
Building Investment (\$)	59236.48	28951.20	162072.62	74831.56
Building Interest (\$)	7108.37	3474.14	19448.71	8979.78
Building Depreciation (\$)	1582.67	827.39	3982.01	1931.91
Average Building Interest & Depreciation Per Sq. Ft. (\$)	0.42	0.48	0.44	0.44
Equipment Investment (\$)	12832.09	13630.93	50442.58	22098.26
Equipment Interest (\$)	1539.85	1635.71	6053.10	2651.78
Equipment Depreciation (\$)	456.69	510.72	1657.16	761.01
Average Equipment Interest & Depreciation Per Sq. Ft. (\$)	0.10	0.24	0.14	0.14
Automotive Investment (\$)	5951.56	4966.53	14888.75	7800.98
Automotive Interest (\$)	714.19	595.98	1786.65	936.12
Automotive Depreciation (\$)	339.65	314.08	788.68	439.74
Average Automotive Interest & Depreciation Per Sq. Ft. (\$)	0.05	0.10	0.05	0.06
Average Investment Per Greenhouse (\$)	79828.75	49723.53	232468.56	107430.75
Average Investment Per Sq. Ft. (\$)	3.87	5.58	4.35	4.30
Average Investment Costs (\$)	11958.43	7618.99	34324.02	16024.34
Average Investment Costs Per Sq. Ft. (\$)	0.58	0.83	0.64	0.64



Average investment per greenhouse was \$79,829 for the greenhouses producing only vegetables, \$49,724 for the bedding plants and vegetables group, and \$232,469 for the flowers, bedding plants and vegetables group. Average investment cost per square foot of greenhouse area for land, buildings, equipment and automotives were 58¢, 86¢, and 64¢ for the vegetables; bedding plants and vegetables; and the crop combination group, respectively. Details of investment and investment costs by greenhouse crops are presented in Table 6.

#### Greenhouse Operating Costs by Crops Produced

As mentioned in the previous section, all greenhouses surveyed were divided into three groups by the types of crops produced to study the distribution of operating costs in 1979-1980. Hired labor was the largest expense item for the group producing a combination of crops as compared to the other two groups. Growing media, seed and cuttings were the second largest expense item for the crop combination group and the highest for the bedding plants and vegetables group. Other common operating costs were greenhouse fuel, utilities, taxes, and repairs and maintenance. All operating costs by types of crops produced incurred in 1979-1980 are listed in Table 7.

Average operating costs per greenhouse were \$27,651 for the group of greenhouses producing only vegetables, \$21,636 for the bedding plants and vegetables group, and \$198,182 for the crop combination group. Average operating costs per square foot of the greenhouse area were \$1.34, \$2.43 and \$3.71 for the group mainly producing vegetables (mostly cucumbers), the bedding plants and vegetables group, and the crop combination group, respectively.

### Greenhouse Production Costs and Returns by Crops Produced

Average gross revenue for the greenhouse operators producing mostly vegetables was \$51,496 per greenhouse in 1979-1980. Gross revenue per square foot of the greenhouse area was \$2.40 for these greenhouses. For the greenhouses producing mainly bedding plants and some vegetables, average gross revenue per greenhouse was \$37,100 or \$4.17 per square foot. Average gross revenue for the crop combination group (flowers, bedding plants and vegetables) was \$93,357 per greenhouse or \$3.74 per square foot.

Average production costs for the vegetables group were \$27,651 per greenhouse or \$2.65 per square foot. For the bedding plants and vegetables group, average production costs were \$39,692 per greenhouse or \$4.46 per square foot. These costs were \$261,423 for the greenhouse operators producing flowers, bedding plants and selected vegetables. Average production costs per square foot of the greenhouse area were \$4.71 for this group.

Average net greenhouse income was relatively higher for the crop combination group than for the other two groups. Net greenhouse income for the crop combination group was \$45,732 per greenhouse, \$23,845 and \$15,464 for the vegetables and bedding plants, and vegetables groups respectively. Average return over cash costs was positive for all three groups. However, returns to management were negative for these groups.

Average return over cash costs were \$1.27 per square foot for the vegetables group; \$1.92 per square foot for the bedding plants and vegetables group; and \$0.98 per square foot for the flowers, bedding plants and vegetables group. Average return over cash costs for the study sample was \$1.19 per square foot.

The major costs in the greenhouse operation were labor costs (hired, operator and family) and material input costs, followed by greenhouse fuel and utilities. Breakdown of all operating and investment costs for the greenhouses by the type of crops produced is presented in Table 8.

#### Greenhouse Investment Costs by Size of Operation

The study sample was further divided into three groups according to the size of the operation. Twenty six (52%) greenhouses were placed in a group for which greenhouse area was up to 19,999 square feet; eighteen (36%) in the 20,000 to 44,999 square foot range; and the remaining six (12%) were put in the 45,000 square foot and over category. Average greenhouse area for the smallest class of greenhouses was 9,022 square feet; for the intermediate size of greenhouses was 27,996 square feet; and 85,160 square feet for the largest greenhouses.

Average land area associated with a greenhouse was 0.93 acres for the group of greenhouses in the up to 19,999 square feet group, 1.54 acres for the greenhouses in 20,000 to 44,999 square foot category and 4.57 acres for the greenhouse in more than 45,000 square foot group.

Average building equipment and automotive investment costs were 76¢ per square foot for the smallest class of greenhouses up to 19,999 square feet group; 61¢ and 60¢ per square foot for the intermediate size and the largest classes of greenhouses, respectively. Average investment costs per greenhouse were \$7,010 or 78¢ per square foot for the greenhouses in the up to 19,999 square feet; \$17,298 or 62¢ per square foot for the group of greenhouses in 20,000 to 44,999 square foot range; and \$51,266 or 61¢ per square foot for the greenhouses in more than 45,000 square foot class. Details on average investment and investment costs by size of operation are presented in Table 9.

TABLE 8

COMPARISON OF COSTS AND RETURNS BY GREENHOUSE CROPS, 1979-80

	<u>Vegetables</u>	<u>Bedding Plants and Vegetables</u>	<u>Flowers, Bedding Plants &amp; Vegetables</u>	<u>Study Sample</u>
Number Surveyed	23	15	12	50
GREENHOUSE AREA (SQ. FT.)	20649	8905	53413	24989
GROSS REVENUE (\$)	51496.04	37099.60	243914.25	93357.44
Gross Revenue Per Sq. Ft. (\$)	2.40	4.17	4.57	3.74
<u>OPERATING COSTS</u>				
Material Inputs	\$ 2156.27	6968.34	51181.58	15825.96
Hired Labor	1722.43	2397.20	61884.41	16363.74
Greenhouse Fuel and Utilities	3633.98	3131.80	17201.66	6739.56
Insurance and Registration Fees	1064.43	494.27	2498.00	1237.44
Repairs and Maintenance	3875.50	1599.20	13804.00	5575.45
Taxes	1947.57	268.74	3932.58	1920.32
Office Supplies	1117.65	179.13	1744.50	986.54
Freight, Leasing and Express	37.57	581.80	4440.75	1257.60
Donations, Memberships and Travel	159.26	206.20	1569.08	511.70
Accounting and Legal	299.35	282.87	1797.50	653.96
Advertising	16.04	681.47	1534.00	579.98
Marketing Costs	4188.78	48.80	1086.92	2202.34
Miscellaneous <sup>1</sup>	446.35	322.00	3230.17	1077.16
Depreciation	2378.97	1651.90	6427.80	3132.55
Interest on Operating Capital	3606.61	2822.05	25849.91	8709.62
TOTAL OPERATING COSTS	\$27650.74	21635.72	198182.50	66773.56
<u>OTHER COSTS</u>				
Land, Building, Equipment Interest	\$ 9579.45	5966.82	27896.21	12891.67
Operator's Labor	17416.35	12089.80	25344.66	17721.18
TOTAL OTHER COSTS	\$26995.80	18056.62	53240.87	30612.85
TOTAL PRODUCTION COSTS	\$54646.54	39692.34	251423.25	97386.44
TOTAL PRODUCTION COSTS PER SQ. FT.	\$ 2.65	4.46	4.71	3.90
NET GREENHOUSE INCOME	\$23845.30	15463.88	45731.75	26583.88
RETURN OVER CASH COSTS <sup>2</sup>	\$26224.27	17115.78	52159.55	29716.43
RETURN OVER CASH COSTS PER SQ. FT.	\$ 1.27	1.92	0.98	1.19
RETURN TO MANAGEMENT	\$(3150.50)	(2592.74)	(7509.00)	(4029.00)
RETURN TO MANAGEMENT PER SQ. FT.	\$ (0.15)	(0.29)	(0.02)	(0.16)

<sup>1</sup>Includes small tools, shop supplies, soil testing and promotional costs other than advertising.

<sup>2</sup>Total operating costs less depreciation.



TABLE 9

COMPARISON OF INVESTMENT AND INVESTMENT COSTS

BY SIZE OF OPERATION, 1979-80

	Up to 19,999 Sq. Ft.	20,000 to 44,999 Sq. Ft.	45,000 Sq. Ft. and Over	Study Sample
Number Surveyed	26	18	6	50
Land Area (acres)	0.93	1.54	4.57	1.59
Land Interest (\$)	190.35	313.93	933.30	2699.94
Land Interest Per Sq. Ft. (\$)	0.02	0.01	0.01	0.01
Building Area (Sq. Ft.)	9023	27996	85160	24989
Building Investment (\$)	31349.42	80311.31	246815.00	74831.56
Building Interest (\$)	3761.93	9637.35	29617.79	8979.78
Building Depreciation (\$)	891.47	2133.84	5834.81	1931.91
Average Building Interest & Depreciation Per Sq. Ft. (\$)	0.52	0.42	0.42	0.44
Equipment Investment (\$)	7896.88	24556.11	76264.00	22098.26
Equipment Interest (\$)	947.62	2946.76	9151.68	2651.78
Equipment Depreciation (\$)	343.96	739.86	2631.71	761.01
Average Equipment Interest & Depreciation Per Sq. Ft. (\$)	0.14	0.13	0.14	0.14
Automotive Investment (\$)	4822.69	8784.44	17756.50	7800.98
Automotive Interest (\$)	578.72	1054.13	2130.78	936.12
Automotive Depreciation (\$)	296.04	471.97	965.82	439.74
Average Automotive Interest & Depreciation Per Sq. Ft. (\$)	0.10	0.05	0.04	0.06
Average Investment Per Greenhouse (\$)	45655.23	116268.00	348613.00	107430.75
Average Investment Per Sq. Ft. (\$)	5.06	4.15	4.09	4.30
Average Investment Costs (\$)	7010.06	17297.79	51265.84	16024.34
Average Investment Costs Per Sq. Ft. (\$)	0.78	0.62	0.60	0.64

### Greenhouse Operating Costs by Size of Operation

Out of all operating cost items, hired labor costs were the highest for the intermediate and the largest groups of greenhouses, followed by growing media, seed/cuttings, repairs and maintenance and greenhouse fuel. Growing media and seed/cuttings were the largest operating cost item for the smallest group of greenhouses. Average operating costs per greenhouse were \$21,363, \$58,543 and \$288,245 for the greenhouses in the up to 19,999 square foot category; 20,000 to 44,999 square feet; and 45,000 square feet or over groups, respectively. In terms of greenhouse operating costs per square foot, these costs were \$2.37 for the smallest size group of greenhouses, \$2.09 for the intermediate group, and \$3.38 for the largest size class of greenhouses. Details of operating costs by size of operation are provided in Table 10.

### Greenhouse Production Costs and Returns by Size of Operation

As mentioned above, the study sample was divided into three groups according to the size of operation. The average area for the smallest size class of greenhouses was 9,023 square feet, the average for the intermediate size was 27,996 square feet, and for the largest size of greenhouses average area was 85,160 square feet.

Average production costs per greenhouse were \$38,607 for the greenhouses in the up to 19,999 square foot group \$95,068 per greenhouse for the greenhouses in 20,000 to 44,999 square foot class, and \$259,055 per greenhouse for the largest category of greenhouses. However, average production costs per square foot were the lowest for the intermediate size greenhouses at \$3.39, compared to \$4.27 for the smallest size group of greenhouses. Average gross

Table 10

COMPARISON OF OPERATING COSTS BY SIZE OF OPERATION, 1979-80

	Up to 19,999 Sq. Ft.	20,000 to 44,999 Sq. Ft.	45,000 Sq. Ft. and Over	Study Sample
Number Surveyed	26	18	6	50
GREENHOUSE AREA (SQ. FT.)	9023	27996	85160	24989
GROSS REVENUE (\$)	33904.69	95793.81	343677.12	93357.44
Growing Media & Seed/Cuttings	\$ 3772.20	10149.61	50228.00	11642.76
Fertilizer and Chemicals	734.15	1952.11	3165.67	1464.40
Containers, Labels and Tags	992.50	2769.67	10046.83	2718.80
Hired Labor	1531.69	10272.66	98909.12	16363.74
Depreciation <sup>1</sup>	1531.29	3345.59	9432.35	3132.55
Greenhouse Fuel	1855.26	3815.50	18214.83	4524.09
Utilities <sup>2</sup>	1283.07	1842.44	7375.00	2215.47
Insurance and Reg. Fees <sup>3</sup>	567.23	1453.28	3494.17	1237.44
Repairs and Maintenance <sup>4</sup>	2004.09	5711.83	20642.16	5575.45
Freight Leasing and Express	167.27	1219.80	6095.66	1257.60
Property Taxes	834.96	2173.28	5139.66	1833.32
Business Taxes	55.77	69.72	274.17	87.00
Office Supplies	404.62	1151.33	3013.83	986.54
Advertising	278.50	533.33	2026.33	579.98
Accounting and Legal	259.85	729.39	2135.50	653.96
Marketing Costs <sup>5</sup>	1794.42	2932.17	1780.50	2202.34
Travel, Donations, Memberships	95.35	411.83	2615.50	511.70
Miscellaneous <sup>6</sup>	414.46	373.83	6058.83	1077.16
Interest on Operating Capital	2786.50	7636.09	37597.18	8709.62
AVERAGE OPERATING COSTS PER GREENHOUSE	\$21363.16	58543.50	288245.12	6673.56
AVERAGE OPERATING COSTS PER SQ. FT.	\$ 2.37	2.09	3.38	2.67

<sup>1</sup>Includes depreciation on buildings, equipment and transportation units.

<sup>2</sup>Includes power, water, telegram and telephone.

<sup>3</sup>Includes motor vehicles, greenhouse and labor insurance.

<sup>4</sup>Includes repair, maintenance and fuel expenses for equipment, buildings and motor vehicles.

<sup>5</sup>Includes commission and other marketing costs.

<sup>6</sup>Includes small tools, shop supplies, soil testing and promotional expenses other than advertising.

revenue for the small greenhouses was \$33,905 or \$3.75 per square foot of the greenhouse area. For the greenhouses in 20,000 to 44,999 square feet class, average gross revenue was \$95,794 or \$3.42. For the third category of greenhouses, i.e., 45,000 square feet and over, average gross revenue was \$343,677 per greenhouse or \$4.04 per square foot (Table 11).

Greenhouses within the production area of 20,000 to 44,999 square feet showed the highest return over cash costs, \$1.60 per square foot, followed by the smallest class of greenhouses i.e., up to 19,999 square feet class at \$1.55 per square foot, and 76¢ per square foot for the greenhouses in 45,000 square feet and over category. Average return over cash costs for the study sample was \$1.19 per square foot of the greenhouse area.

Average return to management for the study sample was negative at 16¢ per square foot or \$4,029 per greenhouse. Only greenhouses in 20,000 to 44,999 square feet class showed positive return to management of \$726 per greenhouse or 3¢ per square foot whereas the other two groups of greenhouses, the smallest and the largest greenhouses, showed negative returns to management of 62¢ and 18¢ per square foot respectively. Details regarding average gross revenue, operating costs, other costs and return over cash costs and return to management for the three size classes of greenhouse operations are given in Table 11.

#### Comparison of Costs and Returns Between the Study Sample and Your Greenhouse

The information in Table 12 will be of particular significance to the study participants as it provides an opportunity for each greenhouse operator to compare his results with those of the study sample. Table 12 lists



Table 11

COMPARISON OF COSTS AND RETURNS BY SIZE OF OPERATION, 1979-80

	Up to 19,999 Sq. Ft.	20,000 to 44,999 Sq. Ft.	45,000 Sq. Ft. and Over	Study Sample
Number Surveyed	26	18	6	50
Average Area (Sq. Ft.)	9023	27996	85160	24989
GROSS REVENUE (\$)	33904.69	95793.81	343677.12	93357.44
GROSS REVENUE PER SQ. FT. (\$)	3.75	3.42	4.04	3.74
<u>OPERATING COSTS</u>				
Material Inputs	\$ 5498.85	14871.39	63440.50	15825.96
Hired Labor	1531.69	10272.66	98909.12	16363.74
Greenhouse Fuel and Utilities	3138.33	5657.94	25589.83	6739.56
Insurance and Registration Fees	567.23	1453.28	3494.17	1237.44
Repairs and Maintenance	2004.09	5711.83	20642.16	5575.45
Taxes	890.73	2233.00	5413.83	1920.32
Office Supplies	404.62	1151.33	3013.83	986.54
Freight, Leasing and Express	167.27	1219.83	6095.66	1257.60
Donations, Memberships and Travel	95.35	411.83	2615.50	511.70
Accounting and Legal	259.85	729.39	213.50	653.96
Advertising	278.50	533.33	2026.33	579.98
Marketing Costs	1794.42	2932.17	1780.50	2202.34
Miscellaneous <sup>1</sup>	414.46	373.83	6058.83	1077.16
Depreciation	1531.29	3345.59	9432.35	3132.55
Interest on Operating Capital	2786.50	7636.09	37597.18	8700.62
TOTAL OPERATING COSTS	\$21353.16	58543.50	288245.12	66773.56
<u>OTHER COSTS</u>				
Land, Building, Equipment Interest	\$ 5478.61	13952.14	41833.53	12891.67
Operator's Labor	17765.30	22572.33	28976.50	17721.18
TOTAL OTHER COSTS	\$17243.91	36524.47	70810.03	30612.85
TOTAL PRODUCTION COSTS	\$38607.07	95067.97	359055.00	97386.44
TOTAL PRODUCTION COSTS PER SQ. FT.	\$ 4.27	3.46	4.22	3.90
NET GREENHOUSE INCOME	\$12541.53	37250.31	55432.00	26583.88
RETURN OVER CASH COSTS <sup>2</sup>	\$14072.82	44886.40	64864.35	29716.43
RETURN OVER CASH COSTS PER SQ. FT.	\$ 1.55	1.60	0.76	1.19
RETURN TO MANAGEMENT <sup>1</sup>	\$(4702.38)	725.84	(15377.88)	(4029.00)
RETURN TO MANAGEMENT PER SQ. FT.	\$ (0.52)	0.03	(0.18)	(0.16)

<sup>1</sup>Includes small tools, shop supplies, soil testing and promotional costs other than advertising.

<sup>2</sup>Total operating costs less depreciation.

Table 12

COMPARISON OF COSTS AND RETURNS BETWEEN  
THE STUDY SAMPLE AND YOUR GREENHOUSE

	<u>Study Sample</u>	<u>Your Greenhouse</u>
Number Surveyed	50	-
Average Area (Sq. Ft.)	24989	-
GROSS REVENUE (\$)	93357.44	-
GROSS REVENUE PER SQ. FT. (\$)	3.74	-
<u>OPERATING COSTS</u>		
Material Inputs	\$15825.96	-
Hired Labor	16363.74	-
Greenhouse Fuel and Utilities	6739.56	-
Insurance and Registration Fees	1237.44	-
Repairs and Maintenance	5575.45	-
Taxes	1920.32	-
Office Supplies	986.54	-
Freight, Leasing and Express	1257.60	-
Donations, Memberships and Travel	511.70	-
Advertising	579.98	-
Accounting and Legal	653.96	-
Marketing Costs	2202.34	-
Miscellaneous <sup>1</sup>	1077.16	-
Depreciation	3132.55	-
Interest on Operating Capital	8709.62	-
TOTAL OPERATING COSTS	\$66773.56	-
<u>OTHER COSTS</u>		
Land, Building, Equipment Interest	\$12891.67	-
Operator's Labor	17721.18	-
TOTAL OTHER COSTS	\$30612.85	-
TOTAL PRODUCTION COSTS	\$97386.41	-
TOTAL PRODUCTION COSTS PER SQ. FT.	\$ 3.90	-
NET GREENHOUSE INCOME	\$26583.88	-
RETURN OVER CASH COSTS <sup>2</sup>	\$29716.43	-
RETURN OVER CASH COSTS PER SQ. FT.	\$ 1.19	-
RETURN TO MANAGEMENT	\$(4028.97)	-
RETURN TO MANAGEMENT PER SQ. FT.	\$ (0.16)	-

<sup>1</sup>Includes small tools, shop supplies, soil testing and promotional costs other than advertising.

<sup>2</sup>Total operating costs less depreciation.

average costs and returns data for the study sample only and a column has been left blank for the personal use of the study participant. Each study participant received a personalized report on his 1979-1980 greenhouse operation along with the results for the study sample divided into regions, by type of crops produced and by size of greenhouse operations. These results were discussed with each greenhouse operator who participated in this study and any comments, concerns or suggestions made by these operators were incorporated into this final report.

## SECTION IV

### COMPARISON BETWEEN 1978 AND 1979-80 GREENHOUSE STUDY RESULTS

It is difficult to compare the 1978-79 and 1979-80 surveys of the greenhouse industry because of the change in the sample and mix of participants, particularly in north and north-central Alberta, Group I. However, a brief comparison of average costs and returns for both surveys is included here for general information.

In the 1978 greenhouse survey (the first year of this study), 33 greenhouse operators provided data on their financial records. In the 1979-80 survey of the greenhouse industry sample size was increased to 50. A few greenhouse operators surveyed in 1978 in north and north-central regions, i.e., Group I, were not included in the 1979-80 survey because of their reluctance to provide detailed information required for this study. Moreover, these operations were so large and diversified that they could not be regarded as representative of the greenhouse industry in north-central Alberta. However, the sample was expanded from 12 greenhouse operations in 1978 to 19 in 1979-80 to include some greenhouse operations in the Peace River region and in north-central Alberta. Average greenhouse area for Group I participants in 1979-80 dropped to 21,977 square feet from 37,422 square feet in 1978. Average gross revenue, production costs, return over cash costs and return to management also declined significantly from 1978.

In south and south-central Alberta, i.e., Group II, the sample size was expanded from 21 greenhouse operations in 1978 to 31 in 1979-80. In this region, average greenhouse



area in 1979-80 remained almost the same as in 1978. However, average gross revenue declined from \$117,606 in 1978 to \$92,954 in 1979-80, thus resulting in negative return to management. Average operating costs were relatively lower in 1979-80 when compared with 1978 survey but not low enough to prevent a negative return to management. Another factor contributing to reduced returns to management for Group I, Group II and the study sample was increased financial costs. The rate of interest applied to investment was 12% in 1979-80 compared to 10% in 1978; interest on operating capital was raised to 15% in 1979-80 versus 13% in 1978 survey. Detailed results from the 1978 greenhouse study along with those from the 1979-80 study are listed in Table 13.

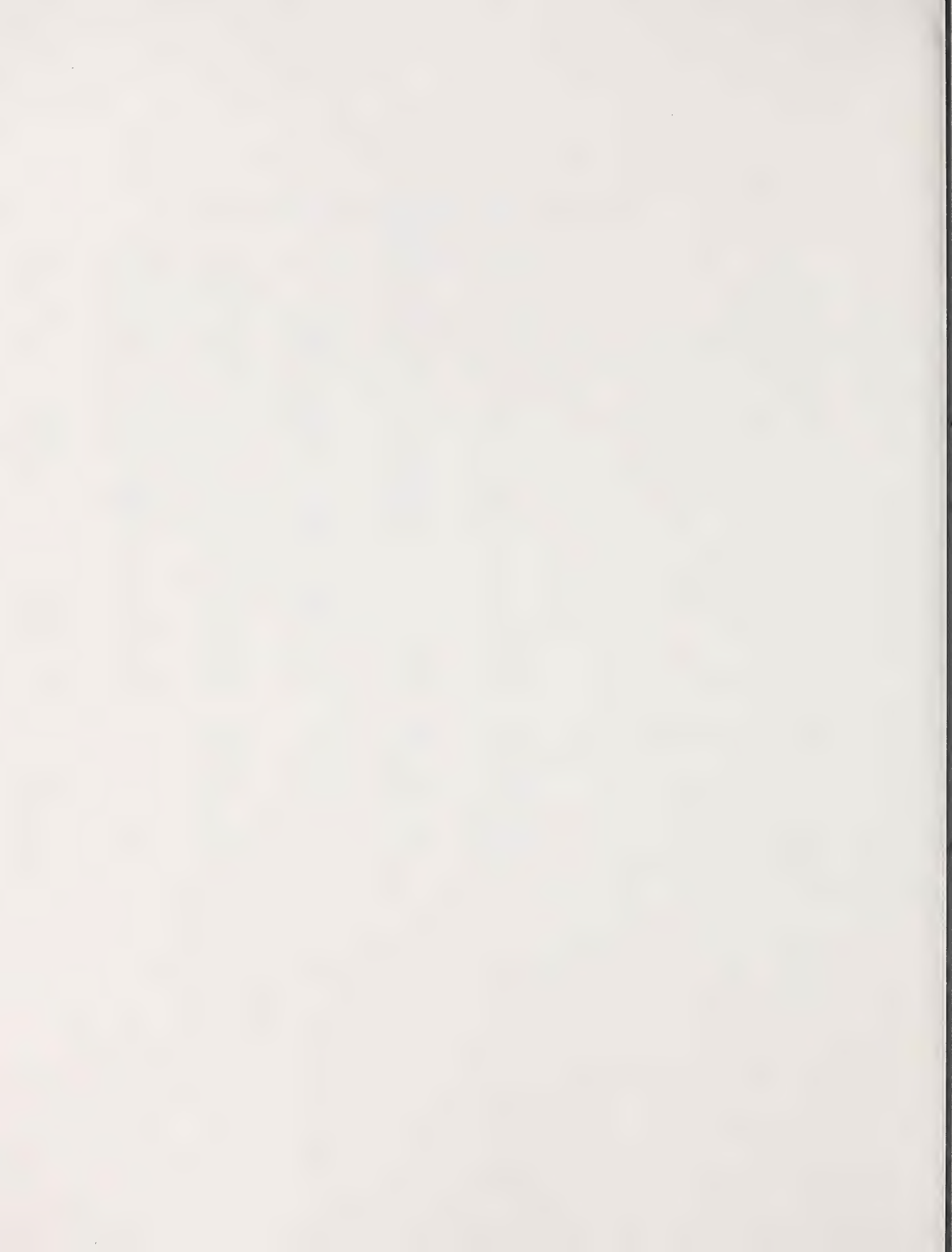
TABLE 13

COMPARISON BETWEEN 1978 AND 1979-80 GREENHOUSE SURVEY RESULTS

	1979-80			1978		
	Group I	Group II	Study Sample	Group I	Group II	Study Sample
Number Surveyed	19	31	50	12	21	33
Average Area (Sq. Ft.)	21977	26836	24989	37422	26449	30439
GROSS REVENUE	\$94016.60	92954.00	93357.00	292643.00	117606.00	181256.00
GROSS REVENUE PER SQ. FT.	\$ 4.28	3.46	3.74	7.82	4.45	5.95
<u>OPERATING COSTS</u>						
Material Inputs	\$19038.47	13857.00	15825.96	45686.08	28437.04	31700.43
Hired Labor	15138.81	17144.48	16363.74	74803.21	15470.91	38036.48
Greenhouse Fuel & Utilities	8728.26	5520.69	6739.56	20552.25	7572.19	12292.22
Insurance & Registration Fees	885.42	1453.19	1237.44	1715.17	1607.67	1646.82
Repairs & Maintenance	3421.84	6895.40	5575.45	8546.00	4487.86	5963.55
Taxes	759.48	2631.81	1920.32	2143.00	2354.19	2277.39
Office Supplies	345.37	1379.52	986.54	1935.33	635.76	1119.24
Freight, Lending & Express	1052.79	1383.13	1257.60	2800.75	1529.00	1991.45
Accounting and Legal	517.16	737.81	653.96	1413.00	400.00	768.36
Donations, Memberships, Travel & Advertising	1201.05	969.48	1091.68	5206.02	2166.82	3297.44
Marketing Costs	102.74	3452.42	2202.31	1753.75	1890.01	1970.46
Miscellaneous <sup>1</sup>	421.79	1476.84	1077.16	7095.32	2243.49	4007.79
Depreciation	3367.26	2988.72	3132.55	11655.95	5895.90	7990.47
Interest on Operating Capital	8269.55	8979.35	8709.62	14685.52	4620.37	7189.51
TOTAL OPERATING COSTS	\$63399.89	68841.56	66773.56	200772.77	80249.78	125066.52
<u>OTHER COSTS</u>						
Land, Building, Equipment Interest	\$13322.18	12627.81	12891.67	17521.43	10097.55	12797.15
Operator's Labor	16145.47	18686.93	17721.18	77172.50	17134.69	17148.44
TOTAL OTHER COSTS	\$29467.65	31314.74	30612.85	34693.93	27232.24	29945.59
TOTAL PRODUCTION COSTS	\$92867.54	100156.30	97386.41	235466.70	107482.02	155012.11
TOTAL PRODUCTION COSTS PER SQ. FT.	\$ 4.23	3.73	3.90	6.29	4.06	5.09
NET GREENHOUSE INCOME	\$30616.30	24112.13	26583.88	91870.23	37356.22	56189.48
RETURN OVER CASH COSTS <sup>2</sup>	\$33983.56	27100.85	29716.43	103526.18	43252.12	64179.95
RETURN OVER CASH COSTS PER SQ. FT.	\$ 1.55	1.01	1.19	2.77	1.64	2.11
RETURN TO MANAGEMENT PER SQ. FT.	\$ 0.05	(0.27)	(0.16)	1.53	0.39	0.86

<sup>1</sup> Includes small tools, shop supplies, soil testing and promotional costs other than advertising.

<sup>2</sup> Total operating costs less depreciation.



## SECTION V

### PRODUCTION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY

Growth in the Alberta greenhouse industry has been relatively slow over the last 10-15 years. Production of greenhouse crops has not kept pace with the increasing demand for greenhouse produce. In turn, increased demand for flowers, flower cuttings, potted plants, and other greenhouse crops has been met by increased shipments from British Columbia, Ontario, the U.S.A. and other countries. Although market opportunities have been good for the greenhouse crops, not enough emphasis has been placed on enhancing domestic production of greenhouse produce.

Greenhouse area in Alberta has increased from 1.8 million square feet in 1977 to 2.2. million square feet in 1979, an increase of 22 per cent over a three year period. During this period the number of firms reporting on their operations increased from 79 to 86 and there could be a few commercial greenhouses still unaccounted for. Crop production and total sales of greenhouse produce in Alberta increased from \$9 million in 1977 to \$10.9 million in 1979, an average increase of 7 per cent per year.

Greenhouse operators surveyed for this study pointed out that several factors have restricted the growth of Alberta's greenhouse industry. Since the 1978-1979 survey of the greenhouse industry and publishing of the report in 1980, the greenhouse industry has remained relatively unchanged, and many of the problems affecting growth of the industry remain unresolved. One notable exception was the substantial tax relief given to greenhouse operators in cities and towns.



The 1979-80 sample size was expanded and similar problems were identified as in the 1978-79 survey. Problems identified by the study participants are summarized as follows:

- i) Greenhouse operations are labor intensive and, in Alberta, skilled labor for greenhouse operations is very scarce. High wage demands make it difficult to maintain steady employment for year-round operations. Moreover, during the peak months of greenhouse operation, finding seasonal labor is a serious problem.
- ii) Greenhouse operators cannot afford to borrow funds from commercial funding agencies, because of the very high interest rates and lack of confidence of these agencies in the pay back potential of the greenhouse industry. Too much time and effort are involved in obtaining funds from private lenders who discourage further investment in the greenhouse industry.

Study participants pointed out that insufficient financial assistance from the government lending institutions has been one of the major factors in limiting growth of the greenhouse industry in Alberta.

- iii) Increase in heating costs is becoming a major concern of the greenhouse operators located in and around urban areas. High heating costs combined with increasing costs for greenhouse supplies appear to be one of the key factors limiting expansion of the greenhouse industry as a whole and production during the winter.

- iv) Increasing transportation costs and problems in hauling perishables from production areas to consumption centres are of great concern to greenhouse operators (especially flower growers) in Alberta. Lack of adequate and dependable transportation service is viewed as a serious obstacle to the expansion of the greenhouse industry in Alberta.
- v) Importation of fresh produce from the U.S.A., Mexico and other provinces has provided severe competition for the local produce. Consumer education has not been significant enough to help expand the local production of greenhouse crops. Operators would like to see more emphasis placed on consumer education encouraging greater consumption of local fresh produce. Consumption of more local produce would in turn help to increase the production of greenhouse crops.



## SECTION VI

### TRANSPORTATION PROBLEMS IN THE ALBERTA GREENHOUSE INDUSTRY

Transportation problems in the Alberta greenhouse industry were listed in the first report published in April 1980. Since then nothing has changed and the problems facing the greenhouse operators, wholesalers and retailers remain the same as before. Problems identified in the previous report are repeated here for consideration by the various transportation organizations and regulating agencies. The specific areas of concern as expressed by the members of Flowers Canada in Alberta, and greenhouse study participants regarding air, bus, truck and rail transportation of perishables are as follows:<sup>1</sup>

#### Air Service

Transportation of perishables by air is not very common in Canada. However, some high valued produce such as fresh flowers (cuttings and flower stems) are being brought in by aeroplane from points in the U.S. (Arizona, California, Oregon and Florida) and from some European countries. Data on volume of air shipments of these produce received in Canada are lacking. However, it is recognized that use of the air service for shipping perishable produce is on the rise in both the U.S. and Canada. With air freight, shipment to the consumer can be made quickly to fulfill contracts, to provide better quality products and to reduce warehousing costs.

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<sup>1</sup>Information was obtained through personal interviews and the briefs presented by Flowers Canada in Alberta, to the Greyhound Bus Services, Motor Transport Board and the Railways.



Air shipment definitely gives the best service and customer satisfaction where speed and time are the critical criteria. The cost of air shipments is a major disadvantage of this service when compared to other transportation modes. However, since deterioration of the product is best counteracted by fast transportation, air service become progressively more advantageous as distance increases.

There is not enough information regarding the air shipment of perishables within and to Canada. The only data which may be related to this service were obtained from the greenhouse operators and florists in Alberta who bring in fresh flowers and flower cuttings from Ontario, the U.S., and occasionally from South America and Europe. Wholesale florists and greenhouse operators expressed the following concerns and reservations about the quality of air service available to them:

- i) Air service is very expensive especially for perishables. Airline general commodity rates with cubed dimensional charge on floral shipments of \$10 per shipment or \$2 per \$100 of value, whichever is the highest, makes this service very expensive.
- ii) It takes too much time to handle air freight at terminals. Handling delays usually occur at the origin and/or destination terminals thereby increasing the time perishables spend in the transportation system. This increased time in transit leads to a deterioration in the quality of the flowers and cuttings. Moreover, the express services of the air carriers in Edmonton and Calgary do not deliver the produce to the greenhouse operators or flower shops in smaller towns.

- iii) Storage facilities both at the origin and destination terminals are inadequate.
- iv) One of the two Canadian national airlines does not allow shipment of perishables, especially cut flowers or mum cuttings, during the winter months, which make it difficult for the Alberta florist businesses to maintain continuous supply.
- v) Lack of coordination between the air service and the express service aggravates the problems and causes delays in delivery of the produce.
- vi) Smaller communities and towns in Alberta lack adequate air service.
- vii) Airline rates of U.S. and Canadian carriers are not uniform.

In addition to the problems mentioned above, there are some general concerns about the air service which not only affect the greenhouse operators, but also other shippers and receivers of perishables. The general concerns include the lack of uniform weight rate regulations between the U.S. and Canada, uneven traffic volume for back haul, and aircraft capacity.

#### Bus Service

Use of bus service is not very common when it comes to shipping or receiving perishables. Wholesalers, florists and greenhouse operators who produce flowers use the bus service for sending very small shipments of cut flowers (arrangements) to nearby communities or across the country. It is uneconomical to ship small loads by rail or truck. During discussions with the greenhouse study participants,

especially the ones who use the bus service, it was revealed that bus service is not quite dependable for shipping fresh flowers. The problems with the bus service which were pointed out by the florists and greenhouse operators include the following:

- i) There are frequent delays in forwarding shipments within a reasonable period of time. These delays occur most often, but not only, during periods of high traffic volume. Most delays involve a number of days rather than hours. Also, when such delays occur, it is usually difficult to trace the shipment.
- ii) Claims for damages are not handled expeditiously. Bus service agents allegedly discourage the filing of claims, and intimate that claims will probably not be paid. Some claim settlements have taken up to nine months to settle.
- iii) The limitation of liability to \$50 is unrealistic, as most floral shipments have a much higher value. Although there is provision for declaring a value higher than \$50, the premiums are quite high and the shipment costs have to be prepaid.
- iv) During the winter months a surcharge is charged on floral shipments, although there is no obvious justification for this surcharge.
- v) A "Shipper Risk" clause is applied when the temperature falls below zero which means there is no guarantee for the safety of the produce or shipments sent during the winter, and in many instances shipments have been damaged enroute.

- vi) There are no facilities for carrying C.O.D. shipments.

#### Truck Service

- i) Motor carriers impose arbitrary embargoes on carriage of perishable products particularly during the months of high demand and high volume of movement (e.g. December - February). Shipments during these months are accepted only "At Owner's Risk" or "At Shipper's Risk".
- ii) Some carriers are not willing to undertake shipments on smaller branchlines which are less profitable.
- iii) Independent truck operators in the province generally refuse to carry products such as flowers and plants. They claim that they do not have the equipment or terminal facilities to handle these products, although their franchise calls for them to carry a full range of general merchandise.
- iv) Alberta members of Flowers Canada have offered to supply material and to instruct personnel of motor truck carriers on better methods of handling perishable products. Despite repeated offers, the carriers have failed to take advantage of this service.
- v) Currently, some carriers are charging three to five times the first class tariff because of a allegedly high claim settlements. So far there are no figures to establish or confirm how much has been paid in claims.



- vi) Lack of appropriate storage facilities at truck terminals results in damage to the produce and a general lack of customer confidence in truck shipments.
- vii) Most of the truckers discourage C.O.D shipments which add to the financial strains of the greenhouse operators and the wholesaler.

### Railway Service

During the last 12 to 15 years, florists across Canada and specifically in Alberta, have seen a marked erosion of rail services; the railways have been advising florists that they have no service or facilities to transport floral products. The florists reported that while rail service was being eroded, they were assured on many occasions by railway representatives that their highway services would provide the floral industry with even better service which in fact has not been the case.

Considerable confusion exists concerning the tariffs being used by railway companies as they apply to highway transportation facilities. The new tariff regulations have set out stringent packaging requirements, a rate structure, and a dimensional weight of 10 pounds per cubic foot which are serious handicaps for the floral industry. Some tariffs shared by railway and motor carriers specify a dimensional weight of 15 pounds per cubic foot which further aggravates the problem of packaging. Application of this higher dimensional weight to a sizable percentage of floral products has increased shipping costs considerably.

Railways' express service made it difficult for other carriers to provide services to smaller communities. Now,

with the rail service being abandoned, these communities do not have any truck service.

Finally, the claim settlement procedure with railway management is said to be very time consuming and tedious.



## SECTION VII

### SUMMARY

#### Summary of Costs and Returns

This section provides summaries of the 1979-80 costs and returns information for the study sample by region, by the types of crops grown in the greenhouses, and by the size of greenhouse operations. The study sample consisted of 50 greenhouse operators across the province. These participants provided detailed financial information on their 1979-80 crop year operations.

When the study sample was divided by region, there were 19 greenhouses (38%) in north and north-central regions (Group I), and 31 greenhouse (72%) in south and south-central regions (Group II). Distribution based on the types of crops produced showed 23 greenhouses (46%) producing mainly vegetables; 15 greenhouses (30%) producing bedding plants and vegetables; and 12 greenhouses (24%) growing flowers, cut flowers, bedding plants, potted plants and selected vegetables. By the size of operation, there were 26 greenhouses (52%) each with an area up to 19,999 square feet; 18 greenhouses (36%) were in the range of 20,000 to 44,999 square feet; and the remaining 6 greenhouses (12%) were in the 45,000 square feet and over category.

Average production costs and returns for the 1979-80 crop year are summarized by region, types of crops produced and the size of the greenhouse operation in Table 14.

The major production costs were labor, material inputs, and greenhouse fuel and utility costs. The relative shares of these costs of total production costs for the study sample were 35 per cent, 16 per cent and 7 per cent, respectively.



TABLE 14

## SUMMARY OF GREENHOUSE PRODUCTION COSTS AND RETURNS, 1979-80

	By Regional Distribution			By Crops Produced			By Size Of Operation		
	Study Sample	Group I	Group II	Vegetables	Bedding Plants & Vegetables	Flowers Bedding Plants & Vegetables	Up to 19,999 sq. ft.	20,000 to 44,999 sq. ft.	45,000 sq. ft. or over
Number Surveyed	50	19	31	23	15	12	26	18	6
GREENHOUSE AREA (SQ. FT.)	24989	21977	26836	20649	8905	53413	9023	27996	85160
GROSS REVENUE (\$)	93357.44	94016.19	92953.69	51496.04	37009.60	243914.25	33904.69	95793.81	343677.12
Gross Revenue Per Sq. Ft. (\$)	3.74	4.28	3.46	2.49	4.17	4.57	3.75	3.42	4.04
<u>OPERATING COSTS</u>									
Material Inputs (\$)	15825.93	19038.47	13857.00	2156.27	6968.34	51181.58	5498.85	14871.39	63440.50
Hired Labor (\$)	16363.74	15138.84	17114.48	1722.43	2397.20	61884.41	1531.69	10272.63	98903.12
Greenhouse Fuel (\$)	4524.09	6068.42	3577.57	2341.29	1828.60	12077.16	1855.26	3815.50	18214.84
Other Operating Costs (\$)	30059.77	23154.16	34292.51	21430.75	10441.58	73039.35	13477.36	29583.95	107680.66
TOTAL OPERATING COSTS (\$)	66773.56	63399.89	68841.56	27650.74	21635.72	198182.50	21363.16	58543.50	288245.12
OPERATING COSTS PER SQ. FT. (\$)	2.67	2.88	2.57	1.34	2.43	3.71	2.37	2.09	3.38
<u>OTHER COSTS</u>									
Land, Building & Equipment - Int. (\$)	12891.97	13322.18	13627.81	9579.45	5966.82	27896.21	5478.61	13952.14	41833.53
Operator's Labor (\$)	17721.18	16145.47	18686.93	17416.35	12059.80	25344.66	11765.30	22572.33	28976.50
TOTAL OTHER COSTS (\$)	30612.85	29467.65	31314.74	26995.80	18056.62	53240.87	17243.91	35324.37	70910.03
TOTAL PRODUCTION COSTS (\$)	97386.41	92867.54	100156.30	54646.54	39692.34	251423.25	38607.09	95067.73	359055.00
TOTAL PRODUCTION COSTS PER SQ. FT. <sup>1</sup>	3.90	4.23	3.73	2.65	4.46	4.71	4.28	3.39	4.22
RETURN OVER CASH COSTS <sup>1</sup>	29716.43	33983.56	27100.85	26224.27	17115.78	52159.55	14072.82	44886.40	64884.35
RETURN OVER CASH COSTS PER SQ. FT. (\$)	1.19	1.55	1.01	1.27	1.92	0.98	1.55	1.60	0.76
RETURN TO MANAGEMENT PER SQ. FT. (\$)	(0.16)	0.05	(0.27)	(0.15)	(0.29)	(0.14)	(0.52)	0.03	(0.18)

GROUP I is North and North Central Regions (3, 4, 5 and 6).

GROUP II is South and South Central Regions (1 and 2).

<sup>1</sup>Total operating costs less depreciation.

Business and property taxes for the study sample made up almost 3 per cent of total operating costs.

Average production costs in 1979-80 for the typical greenhouse surveyed amounted to \$97,386 or \$3.90 per square foot with an estimated gross revenue of \$93,357 per greenhouse or \$3.74 per square foot. As in 1978 average production costs were higher for the greenhouses in north and north-central Alberta, Group I, than for those in south and south-central Alberta, Group II. Total production costs averaged \$4.23 per square foot for Group I versus \$3.73 per square foot for Group II. However, average gross revenue was higher for Group I than for Group II greenhouses. It amounted to \$94,016 or \$4.28 per square foot for Group I participants against \$92,954 or \$3.46 per square foot for Group II participants.

Returns over cash costs averaged \$29,716 or \$1.19 per square foot for the study sample. Returns over cash costs were higher for Group I study participants at \$33,984 (\$1.55 per square foot) and \$27,101 or \$1.01 per square foot for Group II participants. The study sample and greenhouses in Group II showed negative returns to management of 16¢ and 27¢ per square foot whereas greenhouses in Group I showed a positive return to management of 5¢ per square foot.

The greenhouses producing bedding plants and selected vegetables showed higher returns (per square foot) over cash costs compared with the other two categories. Return over cash costs for producers of bedding plants and vegetables was \$1.92 per square foot; for vegetable producers it was \$1.27 per square foot; and 98¢ per square foot for the crop combination group (flowers, bedding plants, and vegetables). All three cropping groups showed negative returns to management.

A comparison of average costs and returns by size of operation indicated that gross revenue per square foot was the highest at \$4.04 for greenhouse operations in 45,000 square foot and over category, followed by the small greenhouses with up to 19,999 square foot at \$3.75, and \$3.42 per square foot for the intermediate size greenhouses. Total production costs per square foot ranged from \$3.39 for intermediate size greenhouses to \$4.28 per square foot for small greenhouses. Return over cash costs was \$1.60 per square foot for intermediate size greenhouses, \$1.55 per square foot for small greenhouses and 76¢ per square foot for large greenhouses. Return to management was negative by 52¢ per square foot for small size greenhouses and 18¢ for large greenhouses. Only the intermediate group of greenhouses broke even with estimated return to management of 3¢ per square foot. Return to management for the study sample was also negative by 16¢ per square foot.

#### Summary of Findings

Findings of the study are summarized as follows:

- i) Considerable variation was found in the greenhouse structures across the province. In the north and north-central regions (3, 4, 5 and 6), the greenhouse structures consisted of fiberglass (46%), plastic (33%) and glass (21%). In the south and south-central regions (1 and 2), the greenhouse structures were mostly of glass (92%), with the balance being fiberglass (8%). Almost no plastic was reported in these regions.

- ii) The results of the 1979-80 survey of the greenhouse industry revealed that average costs and returns were relatively higher in north and north-central Alberta than the greenhouses in south and south-central Alberta.
- iii) Greenhouses producing bedding plants and selected vegetables showed relatively higher return over cash costs when compared with the other two cropping categories.
- iv) Greenhouses in north and north-central Alberta showed a profit of only 5¢ per square foot whereas the greenhouses in south and south-central Alberta showed negative returns of 27¢ per square foot. Low return or negative return to management in 1979-80 crop year compared to last year could be attributed to reduced revenues, higher financial costs and increased costs for greenhouse supplies.
- v) Greenhouses in the intermediate size class showed a positive return to management of 3¢ per square foot whereas the other two size groups showed negative returns to management.
- vi) Twenty four per cent (12) greenhouse operators produced flowers, bedding plants and selected vegetables. One half (6) of these operators marketed 70 to 80 per cent of the produce through owned retailing facilities. The balance was sold to wholesalers and retailers. The other half of these (6) greenhouse operators marketed 15 to 20 per cent of the produce at the gate and balance was sold to wholesalers and retailers.



Thirty per cent (15) of greenhouses produced bedding plants and vegetables. Of these, four greenhouse operators marketed 70 to 80 per cent of the produce at the greenhouse and remainder to wholesalers and retailers. Eleven greenhouse operators marketed only 15 to 20 per cent at the gate; nearly 60 to 70 per cent was sold to retailers and the balance to wholesalers.

Forty six per cent (23) of the greenhouse studied produced only vegetables. Four of these greenhouses sold most of their produce to retailers and wholesalers and the remaining nineteen greenhouse operators marketed the produce through the Red-Hat Co-Op at Redcliff.

- vii) Availability of reliable labor was a serious problem in the greenhouse industry.
- viii) Transportation of flowers, flower cuttings and other greenhouse produce was another major concern of greenhouse operators.
- ix) There is a feeling among the greenhouse operators in Alberta that government lending institutions (both federal and provincial) provide insufficient financial assistance for greenhouse operations. This could be one of the primary factors limiting growth of their industry. Operators feel that the requirements for loans from commercial institutions tend to discourage borrowing for greenhouse purposes.
- x) The cost of energy, a major concern to greenhouse operators, amounted to 7 per cent of total operating costs for the study sample, 9.6 per cent for

Group I (north and north-central Alberta) participants and about 5 per cent for Group II (south and south-central Alberta) participants.

- xi) Average business and property taxes for the study sample amounted to 1.5 per cent of total operating costs. These taxes were 2 per cent of operating costs in the south and south-central regions and less than 1 per cent in the north and north-central regions.
- xii) Greenhouse operators indicated that there was severe competition with fresh produce imported from the U.S. and Mexico. Several study participants said that in order to compete with imports they have to accept lower prices for their produce which, in turn, lowers their receipts.

#### Suggestions and Recommendations

Through discussions with greenhouse operators, wholesalers and retailers, several problems and difficulties have been identified which have resulted in a relatively stagnant greenhouse industry in Alberta over the last several years. The following suggestions and recommendations are therefore listed with the view of alleviating some of the problems facing the greenhouse industry:

- 1) Import tariffs on vegetable and fresh produce could be further strengthened to discourage the increased flow of cheap produce from foreign markets during local peak production periods.
- 2) Greenhouse growers should explore with the province the creation of a greenhouse income assurance plan. The steady increases in costs for finan-

cing, energy, and greenhouse supplies, returns to greenhouse operators are decreasing. With an income assurance plan in place, greenhouse operators will have the incentive to remain in business and possibly expand production.

- 3) Most of the greenhouse operators in Alberta have been borrowing funds for investment in the greenhouse and/or for the greenhouse operation from commercial financial institutions which have relatively higher debt servicing costs as compared to government lending agencies. Therefore, it is recommended that the federal and provincial financial agencies should consider greenhouses at par with farm enterprises for loan purposes.
- 4) Technical assistance such as developing new varieties, plant disease control, nutrient application, optimum growing conditions, and alternative sources of energy or using waste heat energy in the greenhouses should be further encouraged by the government to help improve the management skills of present and prospective greenhouse operators in Alberta.
- 5) Better marketing facilities such as farmers' markets should be established for marketing fresh greenhouse produce in and around major population centres.
- 6) A greenhouse fair could be held once a year at a major population centre to judge Alberta greenhouse produce, to promote modern greenhouse production techniques and to inform Albertans on the value of fresh produce in their daily diets.

Both the industry and the government should participate.

- 7) Railway, truck, bus, and air services could be further improved. The carriers should share liability for product deterioration and damage to perishable commodities while in transit. The corresponding regulations should be strictly enforced to make the various distribution systems more efficient and effective.



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